**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

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| In the Matter of | ) | |
| | ) | GEN Docket 90-314 |
| Amendment of the Commission's | ) | ET Docket 92-100 |
| Rules to Establish New Personal | ) | |
| Communications Services | ) | |

# REPLY COMMENTS OF ANDREW CORPORATION

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**REPLY COMMENTS OF**
**ANDREW CORPORATION**

Andrew Corporation ("Andrew") hereby submits these reply comments in response to the Commission's Notice of Proposed Rulemaking ("Notice") regarding personal communications services ("PCS").[1] In its initial comments, Andrew generally supported the Commission's proposal to allocate spectrum for unlicensed PCS systems, but urged the Commission to increase the allocation for unlicensed PCS by 20 MHz so that a total of 40 MHz will be devoted to unlicensed PCS. Consistent with Andrew's position, virtually all of the parties commenting on the Commission's proposed spectrum allocation for unlicensed PCS concur that the public interest requires that 20 MHz of spectrum proposed by the Commission to house in-building PCS must be increased by 20 MHz for a total allocation of 40 MHz to unlicensed PCS services.

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[1] Amendment of the Commission's Rules to Establish New Personal Communications Services, GEN Docket 90-314, ET Docket 92-100 (released August 14, 1992).

Andrew's initial comments also urged the Commission to recognize the distinction between the frequency allocation and regulatory needs of personal communications networks or what Andrew refers to as "Global-PCS",[2] and the frequency allocation and regulatory needs of the two segments of the in-building PCS market -- the wireless telephony/low speed data market[3] and the high speed wireless data LAN market. Based on the important differences between Global-PCS and in-building PCS, Andrew recommended that the Commission specifically address in this proceeding the myriad technical and regulatory issues unique to in-building PCS. These issues are critical to the development of both segments of the in-building PCS market.[4] Alternatively, if necessary, Andrew encouraged the Commission to issue a further notice of proposed rulemaking in this proceeding to initiate a separate proceeding, on an expedited basis, to address the technical, regulatory, and interconnection issues concerning the in-building PCS market not addressed in the Notice.[5]

The comments in this proceeding demonstrate that a minimum of 40 MHz is necessary for the successful introduction of unlicensed PCS services,[6] and that the

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[2] For purposes of these reply comments, Andrew uses the term Global-PCS to refer to the various proposed personal communications networks that would operate primarily in wide geographic areas outside of buildings.

[3] Wireless telephony refers to wireless private branch exchanges ("PBX"), local area networks ("LANs") and other closed environment wireless voice and low speed data systems.

[4] Comments of Andrew Corporation at 12-13.

[5] Id.

[6] See Comments of Apple Computer, Inc. at 3; Comments of California Microwave at 4; Comments of Hewlett-Packard Company at 2; Comments of Hitachi Telecom (USA) Inc. at 3; Comments of Omnipoint Communications at 10; Comments of Rose

(continued...)

Commission should modify its proposal to address the particular spectrum and regulatory needs of the in-building PCS market.[7/]

## I. AT A MINIMUM, AN ADDITIONAL 20 MHZ OF SPECTRUM MUST BE ALLOCATED TO UNLICENSED PCS TO FACILITATE THE DEVELOPMENT OF HIGH SPEED WIRELESS DATA LANS

The initial comments in this proceeding support Andrew's view that the Commission should allocate, at a minimum, an additional 20 MHz of spectrum for unlicensed PCS for a total of 40 MHz of spectrum. As Andrew noted in its comments, studies have shown that the largest volume of telephone and data traffic is generated in the private business environment.[8/] Yet, the in-building private business market is the only segment of our society with a strong demand for wireless services which is currently devoid of access to any high quality, interference-free, reliable wireless systems that allow full mobility within a building.[9/] To date, the Commission has focused primarily on

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[6/](...continued)
Communications at 3-4; and Comments of the WIN Forum at 7. Rolm, Northern Telecom and Ericsson Corporation also agreed that additional spectrum (15 MHz) should be allocated to unlicensed PCS. See generally Comments of Rolm; Comments of Northern Telecom, Comments of Ericsson Corporation.

[7/] See Comments of Rose Communications at 1; Comments of Spectralink at 3; Comments of Rolm at 7; Comments of Hitachi Telecom (USA) Inc. at 3.

[8/] Opportunities in the U.S. Wireless In-building Business Communications Market, Alexander Resources, Scottsdale, AZ, December 1990 (Survey of 300 businesses reveals that 30% of businesses will have wireless telephone systems by 1997.); U.S. Office Telephony Systems 1991, Economic and Management Consultants, Inc., June 1991 (Wireless penetration of offices with over 400 lines will exceed 16%).

[9/] Comments of Andrew Corporation at 4-5.

addressing the growing consumer demand for Global-PCS while largely ignoring the unique needs and nature of the unlicensed in-building market. Andrew and numerous commenters, including the WIN Forum, urge the Commission to change this disparate treatment and focus on creating the technical and regulatory environment necessary to encourage investment in and development of the in-building PCS market. This is critical since unlicensed PCS is likely to be operational prior to the deployment of licensed Global-PCS networks.

Virtually all of the parties commenting on unlicensed PCS agree that the first step to meeting the immediate and extensive demand for in-building PCS services is to allocate sufficient clear spectrum to facilitate the concurrent development of high quality, interference-free wireless telephony/low speed data services and high-speed wireless LANs.[10/] These services will serve different, yet equally critical, functions in the modern workplace. Wireless telephony/low speed data services will facilitate wireless communications among individuals in the workplace via a wireless PBX and telephone handsets, while high speed wireless data LANs will enable workers to share information and resources and form, dissolve and reform working groups through computers connected to the computer network. Consistent with their different functions in the business environment, each service possesses different frequency requirements, propagation characteristics, and interference tolerance levels that require different

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[10/] See Comments of Apple Computer, Inc. at 3; Comments of Hewlett-Packard Company at 2; Comments of Hitachi Telecom (USA) Inc. at 3; Comments of Omnipoint Communications at 10; Comments of Rose Communications at 3-4; and Comments of the WIN Forum at 7.

equipment and regulatory approaches to facilitate their coexistence with the panoply of other services sharing the 2 GHz band.

Andrew concurs with Rose Communications that "the initial difficulties facing unlicensed PCS should not be further exacerbated by the need to share a band between two disparate services."[11/] Moreover, Rose Communications adds that "[t]o be successful, PCS equipment developers for the unlicensed band must have sufficient spectrum to allow them to optimize the spectrum efficiency characteristics of their specific application. . . and to operate interference-free in the 2 GHz band which is shared with fixed microwave users."[12/] As Andrew pointed out in its initial comments, 20 MHz of spectrum may be enough to facilitate the introduction of cost-effective, high-quality telephony and low speed wireless data systems, but it is wholly inadequate to support reliable, interference-free, high capacity, high speed wireless data LANs. Consistent with Andrew's position, the WIN Forum argues that "spectrum requirements for unlicensed Wireless Telephony Office Systems or ("WTOS") alone exceed 20 MHz."[13/] The WIN Forum explains further that this "information-based society increasingly need[s] and makes use of high data transfer rates of many megabits per second, which is characteristic of computer-to-computer communications such as Ethernet and token ring networks. Wireless equivalents of existing Ethernet and token ring networks could require more than 10 MHz of RF bandwidth to provide the

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11/ Comments of Rose Communications at 6-7.

12/ Id.

13/ See Comments of WIN Forum at 7.

functionality of a single wired connection. The Commission's proposal is simply not responsive to the rapid growth of computers and computer networks."[14] Studies conducted by Rolm, Rose Communications, and International Mobile Machines Corporation ("IMM") all conclude that a minimum of 40 MHz is required to house high speed wireless data LANs.[15] Only an additional allocation of 20 MHz of "clear" spectrum will permit the establishment of interference-free high-speed wireless data LAN systems in closed office environments.

## II. THE COMMISSION SHOULD MODIFY ITS PROPOSAL TO ADDRESS THE PARTICULAR SPECTRUM AND REGULATORY NEEDS OF IN-BUILDING PCS

Consistent with Andrew's comments, numerous commenters highlighted the dual nature of the in-building PCS market and urged the Commission to evaluate separately the distinct and particular needs of in-building PCS and to tailor the myriad technical and regulatory issues to foster the concurrent development of both high-speed wireless data LANs and telephony/low speed data services.[16] Each service possesses unique market characteristics and technical requirements that vary by amount of frequency, frequency bandwidth, bit error rate, nature of transmission, channelization requirements,

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[14] Id.

[15] See Comments of WIN Forum at 7, citing Rose Communications Comments in Docket No. 92-9 at 10-11; Rolm Comments in Docket No. 92-9 at 11; IMM Comments in Docket No. 92-9 at 7.

[16] Comments of Rolm at 7; Comments of Hitachi Telecom (USA), Inc. at 3; Comments of Spectralink Corporation at 3-4; Comments of Rose Communications at 7.

propagation characteristics and power levels. In fact, a number of commenters propose that the Commission divide the unlicensed band into voice and data subbands.[17] Spectralink underscores the distinct technical characteristics of the telephony/low speed data and the high-speed wireless data LAN services noting "that voice and data transmission requirements are fundamentally different from one another. The nature of voice is such that the demand for media access is unpredictable and lengthy. In contrast, data communications tend to be predictable and the use of media is short due to the "bursty" nature of data transmission."[18] Rose Communications further underscores the varying technical considerations noting that "equipment for voice systems normally perform well with bit error rates as high as $10^{-3}$, while high-speed data systems require a more benign environment with bit error rates no worse than $10^{-7}$."[19] Moreover, Andrew concurs with other commenters that the technical differences in the nature of voice transmissions versus data transmissions requires different technical rules to maximize spectrum efficiency.[20]

The Commission must address the particular spectrum and technical needs of the two segments of the in-building PCS market to encourage investment in and the development of wireless services to meet the extensive demands of the business

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[17] Comments of Spectralink Corporation at 3-4; Comments of Rose Communications at 7; Comments of Hitachi Telecom (USA), Inc. at 3; Comments of Rolm at 7-8.

[18] Comments of Spectralink Corporation at 3-4.

[19] Comments of Rose Communications at 7.

[20] Id.

community. The mere allocation of spectrum without a thorough discussion of other issues critical to the successful introduction of high quality, reliable in-building PCS, does not go far enough to advance the expeditious introduction of any form of wireless in-building systems. Accordingly, Andrew urges the Commission to issue a further Notice in this proceeding or, if necessary initiate a separate proceeding on an expedited basis, to consider among others, the following issues:

- Interconnection between Global-PCS and in-building PCS systems;
- Whether the Commission should divide the unlicensed band into voice and data subbands;
- Intersystem roaming;
- Technical interference;
- Frequency coordination;
- Channelization plans;
- Power levels;
- Frequency bandwidths;
- Bit error rates;
- Use of licensed PCS frequencies for unlicensed PCS, and
- Reserve spectrum for use by unlicensed PCS providers.

The Commission should also address specifically the adoption of a spectrum etiquette raised by a number of commenters.[21/] Andrew believes that a spectrum

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[21/] Comments of WIN Forum at 6, 12-14, Comments of Rolm at 10-13; Comments of Ericsson Corporation at 22-23; Comments of Hewlett Packard Company at 2-3.

etiquette would likely minimize interference and facilitate fair access to the unlicensed PCS band and accordingly merits serious consideration by the Commission. While in theory, Andrew supports the idea of a spectrum etiquette for the unlicensed band, Andrew does not believe that the Commission currently has sufficient information or input from interested parties to make any decisions about the technical boundaries, administration or enforcement of a spectrum etiquette.

The initial comments addressing unlicensed PCS issues underscore the need for the Commission to revisit the issue of unlicensed PCS with an eye towards adopting regulatory and technical rules tailored to the differing market and technical characteristics of telephony/low speed data and the high-speed wireless data LAN services that comprise the in-building PCS market. This inquiry should be undertaken expeditiously to permit equipment manufacturers to meet the extensive consumer demand for in-building PCS. Accordingly, Andrew again urges the Commission to issue a further notice of proposed rulemaking in this proceeding or, initiate a separate proceeding, on an expedited basis, to address the numerous issues concerning the in-building PCS market not addressed in the Notice.

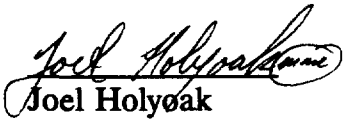
## IV. CONCLUSION

The initial comments addressing in-building PCS uniformly establish that there is substantial demand for wireless in-building services and that the demand cannot be met without the allocation of at least 40 MHz of spectrum for unlicensed high speed data wireless LANs and telephony/low speed wireless data systems. Further, the initial

comments underscore Andrew's view that the Commission must recognize the unique nature of the in-building PCS market and adopt rules to foster the concurrent development of both segments of the in-building PCS market. Accordingly, Andrew urges the Commission to move swiftly to adopt the necessary rules and policies to promote investment in and development of in-building PCS services.

Respectfully submitted,

ANDREW CORPORATION

By: 
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